

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

**LISTING OF CLAIMS**

1. (cancelled)
2. (currently amended) The system of claim 26 +, wherein the face detection module automatically identifies the group of pixels corresponding to the face region when the digital image is received.
3. (currently amended) The system of claim 26 +, wherein the detected face regions are automatically processed for normalization when they are identified.
4. (original) The system of claim 3, wherein the face detection module automatically identifies the group of pixels corresponding to the face region when the digital image is received.
5. (currently amended) The system of claim 26 +, wherein the identifying by the face detection module comprises determining a probability that the group of pixels comprises a face region.
6. (original) The system of claim 5, wherein the identifying further comprises determining whether the probability lies above a predetermined threshold, and if not, automatically determining that the group of pixels does not comprise a face region.

7. (currently amended) The system of claim 26 ~~+~~, wherein ~~the~~ pose normalizing comprises:

- (i) determining the pose of a confirmed face region;
- (ii) mapping said face region onto a 3d average-face model to create an interim 3d model of said face region;
- (iii) rotating said interim 3d model into full frontal alignment; and
- (iv) translating the facial aspect of said interim 3d model back onto 2d image space to create a pose normalized face region.

8. (original) The system of claim 7, wherein the determining of the pose of a confirmed face region further comprises:

- (i) determining locations of principle facial feature within said face region;
- (ii) determining at least two geometric relationships between said facial features;
- (iii) extrapolating from said geometric relationships the plane of the facial region, relative to the normal plane of the image acquisition apparatus thereby determining the facial pose relative to the normal plane of the image acquisition apparatus.

9. (original) The system of claim 8, wherein said principle facial features comprise at least two of eye-pair, nose and mouth regions.

10. (original) The system of claim 7, wherein said determining of the pose of a confirmed face region comprises:

- (i) determining the locations of principle facial feature within said face region;
  - (ii) determining at least two geometric relationships between said facial features;
- and
- (iii) extrapolating from said geometric relationships the plane of the facial region relative to the normal plane of the image acquisition apparatus, thereby determining the facial pose relative to the normal plane of the image acquisition apparatus.

11. (original) The system of claim 7, wherein said mapping of said face region onto a 3d average-face model comprises an additional rescaling of said 3d average face model

along at least one horizontal dimension, said additional rescaling being based on the at least two geometric relationships determined in the pose determining.

12. (original) The system of claim 7, wherein the normalizing further comprises performing one or more additional normalizing operations on said pose normalized face region.

13. (original) The system of claim 12, wherein the one or more additional normalization operations comprise luminance, size, or orientation normalization, or combinations thereof.

14. (currently amended) The system of claim 26 +, wherein the workflow module for determining that the new faceprint corresponds to a first identity, and the database module for archiving the new faceprint within a first face class, and wherein the face recognition module is further for comparing values of face classifier parameters of a second face class including a second faceprint image to values of the parameters corresponding to the first face class including the new faceprint, as well as to further face classes including further faceprints, and for determining based on the comparing whether the second faceprint matches any of the first and further face classes.

15. (currently amended) The system of claim 22 +, wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing by the workflow module comprises determining proximities of the values of the face classifier parameters of the new face print image with values corresponding to the one or more archived faceprints.

16. (currently amended) The system of claim 26 +~~5~~, wherein the proximities of the values correspond to proximities of locations in the multi-dimensional mathematical space defined by the set of face classifier parameters which correspond to a faceprint.

17. (original) The system of claim 16, wherein at least one proximity is statistically calculated based on comparisons with multiple archived faceprints corresponding to a same identity.

18. (original) The system of claim 15, wherein the proximities of the values correspond to at least one of proximities of color, shape, or relative distances between identified locations within the face print images.

19. (original) The system of claim 15, wherein at least one proximity is statistically calculated based on comparisons with multiple archived faceprints corresponding to a same identity.

20. (currently amended) The system of claim ~~26~~ 15, wherein the determining by the face recognition module comprises automatically determining that the new faceprint corresponds to a known identity based on one or more geometric distance proximities being within a predetermined proximity threshold.

21. (original) The system of claim 20, wherein at least one proximity is statistically calculated to be within the threshold when the probability that the proximity is within the threshold is above a predetermined probability value.

22. (currently amended) ~~The system of claim 20~~ A processor-based system operating according to digitally-embedded programming instructions residing on one or more processor-readable memories and communicating with one or more digital data storage media for classifying and archiving images including face regions that are acquired with a digital image acquisition device, the programming instructions comprising:

(a) a face detection module for identifying a group of pixels corresponding to a face region within digital image data acquired by the acquisition device;

(b) a normalization module for generating a normalized face region from said face region;

(c) a face recognition module for automatically extracting a set of values of face classifier parameters from said normalized face region, said set of face classifier parameter values being collectively known as a faceprint associated with said normalized face region;

(d) a workflow module for automatically comparing said extracted faceprint to a database of archived faceprints previously determined to correspond to one or more known identities, and for determining based on the comparing whether a new faceprint corresponds to any of the one or more known identities, the workflow module further for associating the new faceprint and normalized face region from which said faceprint is derived with a new or known identity within a database comprising other data corresponding to the archived faceprints and associated parent images for performing further comparisons with further faceprints; and

(e) a database module for archiving the data according to the associating by the workflow module within one or more digital data storage media, and

wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing by the workflow module comprises determining proximities of the values of the face classifier parameters of the new face print image with values corresponding to the one or more archived faceprints,

wherein the determining by the face recognition module comprises automatically determining that the new faceprint corresponds to a known identity based on one or more geometric distance proximities being within a predetermined proximity threshold, and

wherein the predetermined proximity threshold comprises a first threshold, and the determining by the workflow module comprises confirming ~~requesting user confirmation~~ whether the normalized face region associated with the new faceprint corresponds to a known identity when a geometric distance proximity is outside the first threshold and within a second threshold greater than the first threshold.

23. (original) The system of claim 22, wherein at least one proximity is statistically calculated to be within a threshold when the probability that the proximity is within the threshold is above a predetermined probability value.

24. (original) The system of claim 22, wherein the determining by the workflow module comprises automatically determining that the new faceprint does not correspond to a known identity based on one or more geometric distance proximities being outside the second threshold or a third threshold greater than the second threshold.

25. (currently amended) The system of claim ~~26~~ 15, wherein the determining by the workflow module comprises automatically determining that the new faceprint corresponds to a known identity when comparisons of the face classifier parameter values of the first face print with multiple archived faceprints corresponding to a same known identity each result in a determination of an identity match.

26. (currently amended) ~~The system of claim 15~~ A processor-based system operating according to digitally-embedded programming instructions residing on one or more processor-readable memories and communicating with one or more digital data storage media for classifying and archiving images including face regions that are acquired with a digital image acquisition device, the programming instructions comprising:

(a) a face detection module for identifying a group of pixels corresponding to a face region within digital image data acquired by the acquisition device;

(b) a normalization module for generating a normalized face region from said face region;

(c) a face recognition module for automatically extracting a set of values of face classifier parameters from said normalized face region, said set of face classifier parameter values being collectively known as a faceprint associated with said normalized face region;

(d) a workflow module for automatically comparing said extracted faceprint to a database of archived faceprints previously determined to correspond to one or more known identities, and for determining based on the comparing whether a new faceprint corresponds to any of the one or more known identities, the workflow module further for associating the new faceprint and normalized face region from which said faceprint is derived with a new or known identity within a database comprising other data

corresponding to the archived faceprints and associated parent images for performing further comparisons with further faceprints; and

(e) a database module for archiving the data according to the associating by the workflow module within one or more digital data storage media, and

wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing by the workflow module comprises determining proximities of the values of the face classifier parameters of the new face print image with values corresponding to the one or more archived faceprints, and

wherein the determining by the workflow module comprises requesting user confirmation whether the new faceprint corresponds to a known identity when comparisons of the face classifier parameter values of ~~a~~ the first faceprint with multiple archived faceprints corresponding to a same known identity result in at least one determination of an identity match and at least one determination that the identities do not match.

27. (original) The system of claim 15, wherein the determining by the workflow module comprises requesting user confirmation whether the new face print image corresponds to one or more known identities when comparisons of the face classifier parameter values of the new faceprint with multiple archived faceprints corresponding to multiple known identities result in determinations of identity matches with at least two different identities.

28. (currently amended) The system of claim 26 ~~4~~, wherein the associating by the workflow module comprises grouping the new faceprint with a new or prior face class defined by values of one or more face classifier parameters.

29. (original) The system of claim 28, wherein when the determining by the workflow module results in no identity matches between the new faceprint and any known identity, the workflow module determines that the new face print image corresponds to a new identity and is grouped with a new face class defined by sets of boundary face classifier parameter values, and archives new data accordingly.

30. (original) The system of claim 29, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint corresponding to the new identity comprises associating the new data with archived data corresponding to one or more known identities based on a relationship between the new identity and the one or more known identities.

31. (original) The system of claim 29, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint corresponding to the new identity comprises associating the new data with a further new identity based on a relationship between the two new identities.

32. (original) The system of claim 31, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint comprises generating a new face class defined by sets of boundary face classifier parameter values including the particular face parameter values of the new face print image.

33. (original) The system of claim 29, wherein the archiving further comprises grouping the new face class with another face class within a same identity table corresponding to a same appearance of a known identity.

34. (original) The system of claim 33, wherein the archiving further comprises adjusting boundary face classifier parameter values of a different identity based on adjusted boundary values of the identity including the new face class.

35. (original) The system of claim 29, wherein the archiving further comprises grouping the new face class within a first identity table, and grouping the first identity table with a second identity table, including a second face class, together within a same appearance table corresponding to a different appearances of a same known identity.



36. (original) The system of claim 35, wherein the archiving further comprises adjusting boundary face classifier parameter values of a different identity based on new or adjusted boundary values of the identity including the new face class.

37. (original) The system of claim 29, wherein the archiving further comprises grouping the new face class within a previously generated identity table including multiple face classes corresponding to multiple different values of face classifier parameters corresponding to a same appearance of a same identity.

38. (original) The system of claim 37, wherein the archiving further comprises adjusting boundary face classifier parameter values of the identity based on parameters of the new face class.

39. (original) The system of claim 38, wherein the archiving further comprises adjusting boundary face classifier parameter values of a different identity based on parameters of the adjusted boundary values of the identity including the new face class.

40. (original) The system of claim 28, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint comprises grouping the new faceprint within a previously-determined face class defined by sets of boundary face classifier parameter values including particular face classifier parameter values of the new faceprint.

41. (original) The system of claim 40, wherein the archiving further comprises re-defining the boundaries of the previously-determined face class based on one or more particular face classifier parameter values of the new faceprint being outside previously established boundary values.

42. (original) The system of claim 40, wherein the face class has been previously grouped with one or more other face classes within a same identity table corresponding to a same known identity, and wherein the archiving further comprises adjusting boundary

values of the identity table based on adjusted boundary values of the face class including the new faceprint.

43. (currently amended) The system of claim 26 +, wherein the programming instructions further comprise an image detection module for determining that a new image is presented for face detection processing.

44. (currently amended) The system of claim 26 +, wherein the programming instructions further comprise a set of user interface modules for obtaining user input in the detection of face candidate regions, or the classifying, archiving or recalling of faceprints or associated normalized face regions, or combinations thereof.

45. (currently amended) The system of claim 26 +, wherein the programming instructions are stored on or accessible by a stand alone processor-based device configured for receiving raw image data from a digital camera, and the device being coupled with or including user interface hardware, and upon which the classifying is performed.

46. (currently amended) The system of claim 26 +, wherein the programming instructions are stored at least in part on an embedded appliance for performing some image classifying-related processing prior to outputting processed image data to a further processor-based device upon which the classifying is further performed.

47. (original) The system of claim 46, wherein the embedded appliance comprises a digital camera.

48. (original) The system of claim 47, wherein the digital camera comprises a dedicated digital camera or a camera-capable handheld pda or phone, or a combination thereof.

49. (currently amended) The system of claim 26 +, wherein the programming instructions are stored at least in part on a processor-based device connected to a network

for performing some image classifying-related processing on the device prior to outputting processed data to a back-end server upon which the classifying is further performed.

50. (currently amended) The system of claim 26 +1, wherein the identifying by the face detection module or the comparing by the face recognition module, or both, comprise receiving and utilizing user input confirmation.

51. (currently amended) The system of claim 26 +, wherein the identifying by the face detection module or the comparing by the face recognition module, or both, are configured for auto-processing subject to selective disablement of the auto-processing by a user.

52. (currently amended) The system of claim 26 +, wherein the identifying by the face detection module applies automatic face region identification when a detection probability is calculated to be above a detection probability threshold or the comparing by the face recognition module applies automatic identity recognition when a matching probability with a prior faceprint is calculated to be above a matching probability threshold, or both.

53. (original) The system of claim 52, wherein the detection probability threshold or the matching probability threshold, or both, are adjustable.

54. (original) The system of claim 53, wherein the detection threshold or the matching threshold, or both, are adjustable by a user, a manufacturer, or an adaptive learning program of the system, or combinations thereof.

55. (currently amended) The system of claim 26 +, wherein the programming instructions are stored on or accessible by processor-based components within a digital camera upon which the classifying is performed.

56. (currently amended) The system of claim 26 +, wherein the set of face classifier parameters are principle component vectors derived from a set of eigenface descriptors.

57. (currently amended) The system of claim 26 +, wherein the set of face classifier parameters are independent component vectors derived from an independent component analysis of a normalized face image.

58. (currently amended) The system of claim 26 +, wherein the set of face classifier parameters are fourier components derived from a 2d fourier transformation of the normalized face region.

59. (currently amended) The system of claim 26 +, wherein the set of face classifier parameters are discrete fourier transform vectors derived from a 2d discrete cosine transform of the normalized face region.

60. (currently amended) The system of claim 26 +, wherein the set of face classifier parameters are wavelet transform components derived from a 2d wavelet transform of the normalized face region.

61. (currently amended) The system of claim 26 +, wherein the set of face classifier parameters are gabor transform components derived from a 2d gabor transform of the normalized face region.

62. (currently amended) ~~The system of claim 1~~ A processor-based system operating according to digitally-embedded programming instructions residing on one or more processor-readable memories and communicating with one or more digital data storage media for classifying and archiving images including face regions that are acquired with a digital image acquisition device, the programming instructions comprising:

(a) a face detection module for identifying a group of pixels corresponding to a face region within digital image data acquired by the acquisition device;

(b) a normalization module for generating a normalized face region from said face region;

(c) a face recognition module for automatically extracting a set of values of face classifier parameters from said normalized face region, said set of face classifier parameter values being collectively known as a faceprint associated with said normalized face region;

(d) a workflow module for automatically comparing said extracted faceprint to a database of archived faceprints previously determined to correspond to one or more known identities, and for determining based on the comparing whether a new faceprint corresponds to any of the one or more known identities, the workflow module further for associating the new faceprint and normalized face region from which said faceprint is derived with a new or known identity within a database comprising other data corresponding to the archived faceprints and associated parent images for performing further comparisons with further faceprints; and

(e) a database module for archiving the data according to the associating by the workflow module within one or more digital data storage media, and

wherein the set of face classifier parameters comprises a combination of two or more of principle components vectors, independent component vectors, fourier components, discrete cosine transform components, wavelet transform components and gabor transform components.

63. (original) The system of claim 62, wherein the set of face classifier parameters includes additional classifiers or subsets thereof which further characterize the shape, texture, color distribution or localized physical features of the face region.

64. (original) The system of claim 62, wherein the set of face classifier parameters may be subdivided into two or more subsets of face classifier parameters wherein each subset facilitates a particular step of the comparing and determining a match of said set of face classifier parameters with a previously determined known identity.

65. (original) The system of claim 64, wherein one of said subsets of face classifier parameters verifies that the face region is similar enough to the face region of one or more known identities to be correctly recognized; and wherein the second of said subsets of face classifier parameters completes the recognition process by determining which of said known identities said face region should be associated with.

66. (currently amended) The system of claim 26 +, wherein the archiving further for enabling further comparisons with further faceprints and for recalling the faceprints and their associated normalized face regions and parent images.

67. (cancelled)

68. (currently amended) The system of claim 112 ~~67~~, wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing by the workflow module comprises determining proximities of the values of the face classifier parameters of the new face print image with values corresponding to the one or more archived faceprints.

69. (original) The system of claim 68, wherein the proximities of the values correspond to proximities of locations in the multi-dimensional mathematical space defined by the set of face classifier parameters which correspond to a faceprint.

70. (original) The system of claim 69, wherein at least one proximity is statistically calculated based on comparisons with multiple archived faceprints corresponding to a same identity.

71. (original) The system of claim 68, wherein the proximities of the values correspond to at least one of proximities of color, shape, or relative distances between identified locations within the face print images.

72. (original) The system of claim 71, wherein at least one proximity is statistically calculated based on comparisons with multiple archived faceprints corresponding to a same identity.

73. (original) The system of claim 68, wherein the determining comprises automatically determining that the new faceprint corresponds to a known identity based on one or more geometric distance proximities being within a predetermined proximity threshold.

74. (original) The system of claim 73, wherein at least one proximity is statistically calculated to be within the threshold when the probability that the proximity is within the threshold is above a predetermined probability value.

75. (currently amended) ~~The system of claim 73~~ A processor-based system operating according to digitally-embedded programming instructions residing on one or more processor-readable memories and communicating with one or more digital data storage media for classifying and archiving images including face regions that are acquired with a digital image acquisition device, the programming instructions comprising a workflow module providing for the automatic or semiautomatic processing of normalized face regions from which face classifier parameter values are automatically extracted and collectively referred to as a faceprint, the processing comprising:

(i) automatically comparing said extracted faceprint to a database of archived faceprints previously determined to correspond to one or more known identities,

(ii) determining based on the comparing whether a new faceprint corresponds to any of the one or more known identities, and

(iii) associating the new faceprint and normalized face region from which said faceprint is derived with a new or known identity within a database comprising other data corresponding to the archived faceprints and associated parent images for performing further comparisons with further faceprints, to permit data corresponding to the new faceprint and its associated parent image to be archived according to the associating by the workflow module within one or more digital data storage media, and

wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing by the workflow module comprises determining proximities of the values of the face classifier parameters of the new face print image with values corresponding to the one or more archived faceprints, and

wherein the determining comprises automatically determining that the new faceprint corresponds to a known identity based on one or more geometric distance proximities being within a predetermined proximity threshold, and

wherein the predetermined proximity threshold comprises a first threshold, and the determining by the workflow module comprises confirming ~~requesting user confirmation~~ whether a the normalized face region associated with the new faceprint corresponds to a known identity when a geometric distance proximity is outside the first threshold and within a second threshold greater than the first threshold.

76. (original) The system of claim 75, wherein at least one proximity is statistically calculated to be within a threshold when the probability that the proximity is within the threshold is above a predetermined probability value.

77. (original) The system of claim 75, wherein the determining by the workflow module comprises automatically determining that the new faceprint does not correspond to a known identity based on one or more geometric distance proximities being outside the second threshold or a third threshold greater than the second threshold.

78. (original) The system of claim 68, wherein the determining by the workflow module comprises automatically determining that the new faceprint corresponds to a known identity when comparisons of the face classifier parameter values of the first face print with multiple archived faceprints corresponding to a same known identity each result in a determination of an identity match.

79. (currently amended) ~~The system of claim 68~~ A processor-based system operating according to digitally-embedded programming instructions residing on one or more



processor-readable memories and communicating with one or more digital data storage media for classifying and archiving images including face regions that are acquired with a digital image acquisition device, the programming instructions comprising a workflow module providing for the automatic or semiautomatic processing of normalized face regions from which face classifier parameter values are automatically extracted and collectively referred to as a faceprint, the processing comprising:

(i) automatically comparing said extracted faceprint to a database of archived faceprints previously determined to correspond to one or more known identities,

(ii) determining based on the comparing whether a new faceprint corresponds to any of the one or more known identities, and

(iii) associating the new faceprint and normalized face region from which said faceprint is derived with a new or known identity within a database comprising other data corresponding to the archived faceprints and associated parent images for performing further comparisons with further faceprints, to permit data corresponding to the new faceprint and its associated parent image to be archived according to the associating by the workflow module within one or more digital data storage media, and

wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing by the workflow module comprises determining proximities of the values of the face classifier parameters of the new face print image with values corresponding to the one or more archived faceprints, and

wherein the determining by the workflow module comprises confirming ~~requesting user confirmation~~ whether the new faceprint corresponds to a known identity when comparisons of the face classifier parameter values of the first faceprint with multiple archived faceprints corresponding to a same known identity result in at least one determination of an identity match and at least one determination that the identities do not match.

80. (original) The system of claim 68, wherein the determining by the workflow module comprises requesting user confirmation whether the new face print image corresponds to one or more known identities when comparisons of the face classifier parameter values of

the new faceprint with multiple archived faceprints corresponding to multiple known identities result in determinations of identity matches with at least two different identities.

81. (currently amended) The system of claim 79 ~~67~~, wherein the associating by the workflow module comprises grouping the new faceprint with a new or prior face class defined by values of one or more face classifier parameters.

82. (original) The system of claim 81, wherein when the determining by the workflow module results in no identity matches between the new faceprint and any known identity, the workflow module determines that the new face print image corresponds to a new identity and is grouped with a new face class defined by sets of boundary face classifier parameter values, and archives new data accordingly.

83. (original) The system of claim 82, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint corresponding to the new identity comprises associating the new data with archived data corresponding to one or more known identities based on a relationship between the new identity and the one or more known identities.

84. (original) The system of claim 82, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint corresponding to the new identity comprises associating the new data with a further new identity based on a relationship between the two new identities.

85. (original) The system of claim 82, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint comprises generating a new face class defined by sets of boundary face classifier parameter values including the particular face parameter values of the new face print image.

86. (original) The system of claim 85, wherein the archiving further comprises grouping the new face class with another face class within a same identity table corresponding to a same appearance of a known identity.

87. (original) The system of claim 86, wherein the archiving further comprises adjusting boundary face classifier parameter values of a different identity based on adjusted boundary values of the identity including the new face class.

88. (original) The system of claim 85, wherein the archiving further comprises grouping the new face class within a first identity table, and grouping the first identity table with a second identity table, including a second face class, together within a same appearance table corresponding to a different appearances of a same known identity.

89. (original) The system of claim 88, wherein the archiving further comprises adjusting boundary face classifier parameter values of a different identity based on new or adjusted boundary values of the identity including the new face class.

90. (original) The system of claim 85, wherein the archiving further comprises grouping the new face class within a previously generated identity table including multiple face classes corresponding to multiple different values of face classifier parameters corresponding to a same appearance of a same identity.

91. (original) The system of claim 90, wherein the archiving further comprises adjusting boundary face classifier parameter values of the identity based on parameters of the new face class.

92. (original) The system of claim 91, wherein the archiving further comprises adjusting boundary face classifier parameter values of a different identity based on parameters of the adjusted boundary values of the identity including the new face class.

93. (original) The system of claim 82, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint comprises grouping the new faceprint within a previously-determined face class defined by sets of boundary face classifier parameter values including particular face classifier parameter values of the new faceprint.

94. (original) The system of claim 93, wherein the archiving further comprises re-defining the boundaries of the previously-determined face class based on one or more particular face classifier parameter values of the new faceprint being outside previously established boundary values.

95. (original) The system of claim 93, wherein the face class has been previously grouped with one or more other face classes within a same identity table corresponding to a same known identity, and wherein the archiving further comprises adjusting boundary values of the identity table based on adjusted boundary values of the face class including the new faceprint.

96. (currently amended) The system of claim ~~79~~ 67, wherein the programming instructions further comprise an image detection module for determining that a new image is presented for face detection processing.

97. (currently amended) The system of claim ~~79~~ 67, wherein the programming instructions further comprise a set of user interface modules for obtaining user input in the detection of face candidate regions, or the classifying, archiving or recalling of faceprints or associated normalized face regions, or combinations thereof.

98. (currently amended) The system of claim ~~79~~ 67, wherein the programming instructions are stored on or accessible by a stand alone processor-based device configured for receiving raw image data from a digital camera, and the device being coupled with or including user interface hardware, and upon which the classifying is performed.

99. (currently amended) The system of claim 79 67, wherein the programming instructions are stored at least in part on an embedded appliance for performing some image classifying-related processing prior to outputting processed image data to a further processor-based device upon which the classifying is further performed.

100. (original) The system of claim 99, wherein the embedded appliance comprises a digital camera.

101. (original) The system of claim 100, wherein the digital camera comprises a dedicated digital camera or a camera-capable handheld pda or phone, or a combination thereof.

102. (currently amended) The system of claim 79 67, wherein the programming instructions are stored at least in part on a processor-based device connected to a network for performing some image classifying-related processing on the device prior to outputting processed data to a back-end server upon which the classifying is further performed.

103. (currently amended) The system of claim 79 67, wherein the programming instructions are stored on or accessible by processor-based components within a digital camera upon which the classifying is performed.

104. (currently amended) The system of claim 79 67, wherein the set of face classifier parameters are principle component vectors derived from a set of eigenface descriptors.

105. (currently amended) The system of claim 79 67, wherein the set of face classifier parameters are independent component vectors derived from an independent component analysis of a normalized face image.

106. (currently amended) The system of claim ~~79~~ 67, wherein the set of face classifier parameters are fourier components derived from a 2d fourier transformation of the normalized face region.

107. (currently amended) The system of claim ~~79~~ 67, wherein the set of face classifier parameters are discrete fourier transform vectors derived from a 2d discrete cosine transform of the normalized face region.

108. (currently amended) The system of claim ~~79~~ 67, wherein the set of face classifier parameters are wavelet transform components derived from a 2d wavelet transform of the normalized face region.

109. (currently amended) The system of claim ~~79~~ 67, wherein the set of face classifier parameters are gabor transform components derived from a 2d gabor transform of the normalized face region.

110. (currently amended) The system of claim ~~79~~ 67, wherein the set of face classifier parameters comprises a combination of two or more of principle components vectors, independent component vectors, fourier components, discrete cosine transform components, wavelet transform components and gabor transform components.

111. (original) The system of claim 110, wherein the set of face classifier parameters includes additional classifiers or subsets thereof which further characterize the shape, texture, color distribution or localized physical features of the face region.

112. (currently amended) ~~The system of claim 110~~ A processor-based system operating according to digitally-embedded programming instructions residing on one or more processor-readable memories and communicating with one or more digital data storage media for classifying and archiving images including face regions that are acquired with a digital image acquisition device, the programming instructions comprising a workflow module providing for the automatic or semiautomatic processing of normalized face

regions from which face classifier parameter values are automatically extracted and collectively referred to as a faceprint, the processing comprising:

(i) automatically comparing said extracted faceprint to a database of archived faceprints previously determined to correspond to one or more known identities,

(ii) determining based on the comparing whether a new faceprint corresponds to any of the one or more known identities, and

(iii) associating the new faceprint and normalized face region from which said faceprint is derived with a new or known identity within a database comprising other data corresponding to the archived faceprints and associated parent images for performing further comparisons with further faceprints, to permit data corresponding to the new faceprint and its associated parent image to be archived according to the associating by the workflow module within one or more digital data storage media, and wherein the set of face classifier parameters comprises a combination of two or more of principle components vectors, independent component vectors, fourier components, discrete cosine transform components, wavelet transform components and gabor transform components; and

wherein the set of face classifier parameters may be subdivided into two or more subsets of face classifier parameters wherein each subset facilitates a particular step of the comparing and determining a match of said set of face classifier parameters with a previously determined known identity.

113. (original) The system of claim 112, wherein one of said subsets of face classifier parameters verifies that the face region is similar enough to the face region of one or more known identities to be correctly recognized; and wherein the second of said subsets of face classifier parameters completes the recognition process by determining which of said known identities said face region should be associated with.

114. (currently amended) The system of claim 79 ~~67~~, wherein the archiving further for enabling further comparisons with further faceprints and for recalling the faceprints and their associated normalized face regions and parent images.

115. (currently amended) The system of claim 79 ~~67~~, further comprising a face detection module which automatically identifies groups of pixels corresponding to face regions when digital images are received.

116. (currently amended) The system of claim 79 ~~67~~, further comprising a face detection module, wherein detected face regions are automatically processed for normalization when they are identified within digital images.

117. (original) The system of claim 116, wherein the face detection module automatically identifies groups of pixels corresponding to face regions when digital images are received.

118. (currently amended) The system of claim 79 ~~67~~, further comprising a normalization module for generating a normalized face region from an identified face region within digital image data acquired by the acquisition device.

119. (original) The system of claim 118, wherein the normalization module comprises programming instructions for:

- (i) determining the pose of a confirmed face region;
- (ii) mapping said face region onto a 3d average-face model to create an interim 3d model of said face region;
- (iii) rotating said interim 3d model into full frontal alignment; and
- (iv) translating the facial aspect of said interim 3d model back onto 2d image space to create a pose normalized face region.

120. (original) The system of claim 119, wherein the determining of the pose of a confirmed face region comprises:

- (i) determining locations of principle facial feature within said face region;
- (ii) determining at least two geometric relationships between said facial features;



(iii) extrapolating from said geometric relationships the plane of the facial region, relative to the normal plane of the image acquisition apparatus thereby determining the facial pose relative to the normal plane of the image acquisition apparatus.

121. (original) The system of claim 120, wherein said principle facial features comprise at least two of eye-pair, nose and mouth regions.

122. (original) The system of claim 119, wherein said determining of the pose of a confirmed face region comprises:

- (i) determining the locations of principle facial feature within said face region;
  - (ii) determining at least two geometric relationships between said facial features;
- and
- (iii) extrapolating from said geometric relationships the plane of the facial region relative to the normal plane of the image acquisition apparatus, thereby determining the facial pose relative to the normal plane of the image acquisition apparatus.

123. (original) The system of claim 119, wherein said mapping of said face region onto a 3d average-face model comprises an additional rescaling of said 3d average face model along at least one horizontal dimension, said additional rescaling being based on the at least two geometric relationships determined in the pose determining.

124. (original) The system of claim 119, the normalizing further comprising performing one or more additional normalization operations on said pose normalized face region.

125. (original) The system of claim 123, wherein the one or more additional normalization operations comprise luminance, size, or orientation normalization, or combinations thereof.

126. (original) The system of claim 118, the workflow module further for digitally organizing and selectively recalling said archived faceprints and the associated parent images.

127. (original) The system of claim 118, further comprising a set of user interface modules for obtaining user input in the classifying of faceprints and their associated normalized face regions and parent images.

128. (cancelled)

129. (currently amended) The method of claim ~~135~~ 127, wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing comprises determining proximities of the values of the face classifier parameters of ~~a~~ the new face print image with values corresponding to the one or more archived faceprints.

130. (original) The method of claim 129, wherein the proximities of the values correspond to proximities of locations in a multi-dimensional mathematical space defined by the set of face classifier parameters which correspond to a faceprint.

131. (original) The method of claim 130, further comprising statistically calculating at least one proximity based on comparisons with multiple archived faceprints corresponding to a same identity.

132. (original) The method of claim 129, wherein the determining comprises automatically determining that the new faceprint corresponds to a known identity based on one or more geometric distance proximities being within a predetermined proximity threshold.

133. (original) The method of claim 132, further comprising statistically calculating at least one proximity to be within the threshold when the probability that the proximity is within the threshold is above a predetermined probability value.

134. (original) The method of claim 132, wherein the predetermined proximity threshold comprises a first threshold, and the determining comprises requesting user confirmation whether the normalized face region associated with the new faceprint corresponds to a known identity when a geometric distance proximity is outside the first threshold and within a second threshold greater than the first threshold.

135. (currently amended) ~~The method of claim 133~~ A method for classifying and archiving images including face regions that are acquired with an image acquisition device, comprising:

(a) generating a normalized face region from an identified face region within digital image data acquired by the acquisition device;

(b) automatically extracting a set of face classifier parameter values, collectively referred to as a faceprint, from the normalized face region;

(c) automatically comparing said extracted faceprint to a database of archived faceprints previously determined to correspond to one or more known identities;

(d) determining based on the comparing whether a new faceprint corresponds to any of the one or more known identities; and

(e) associating the new faceprint with a new or known identity within a database comprising other data corresponding to the archived faceprints and associated parent images for performing further comparisons with further faceprints, to permit data corresponding to the new faceprint and its associated parent image to be archived according to the associating by the workflow module within one or more digital data storage media, and

wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing comprises determining proximities of the values of the face classifier parameters of the new face print image with values corresponding to the one or more archived faceprints, and

wherein the determining comprises automatically determining that the new faceprint corresponds to a known identity based on one or more geometric distance proximities being within a predetermined proximity threshold, and

wherein the predetermined proximity threshold comprises a first threshold, and the determining comprises requesting user confirmation whether the normalized face region associated with the new faceprint corresponds to a known identity when a geometric distance proximity is outside the first threshold and within a second threshold greater than the first threshold, and

statistically calculating at least one proximity to be within a threshold when the probability that the proximity is within the threshold is above a predetermined probability value.

136. (currently amended) ~~The method of claim 133~~ A method for classifying and archiving images including face regions that are acquired with an image acquisition device, comprising:

(a) generating a normalized face region from an identified face region within digital image data acquired by the acquisition device;

(b) automatically extracting a set of face classifier parameter values, collectively referred to as a faceprint, from the normalized face region;

(c) automatically comparing said extracted faceprint to a database of archived faceprints previously determined to correspond to one or more known identities;

(d) determining based on the comparing whether a new faceprint corresponds to any of the one or more known identities; and

(e) associating the new faceprint with a new or known identity within a database comprising other data corresponding to the archived faceprints and associated parent images for performing further comparisons with further faceprints, to permit data corresponding to the new faceprint and its associated parent image to be archived according to the associating by the workflow module within one or more digital data storage media, and

wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing comprises determining proximities of the values of the face classifier parameters of the new face print image with values corresponding to the one or more archived faceprints, and

wherein the determining comprises automatically determining that the new faceprint corresponds to a known identity based on one or more geometric distance proximities being within a predetermined proximity threshold, and

wherein the predetermined proximity threshold comprises a first threshold, and the determining comprises requesting user confirmation whether the normalized face region associated with the new faceprint corresponds to a known identity when a geometric distance proximity is outside the first threshold and within a second threshold greater than the first threshold, and

wherein the determining comprises automatically determining that the new faceprint does not correspond to a known identity based on one or more geometric distance proximities being outside the second threshold or a third threshold greater than the second threshold.

137. (currently amended) ~~The method of claim 128~~ A method for classifying and archiving images including face regions that are acquired with an image acquisition device, comprising:

(a) generating a normalized face region from an identified face region within digital image data acquired by the acquisition device;

(b) automatically extracting a set of face classifier parameter values, collectively referred to as a faceprint, from the normalized face region;

(c) automatically comparing said extracted faceprint to a database of archived faceprints previously determined to correspond to one or more known identities;

(d) determining based on the comparing whether a new faceprint corresponds to any of the one or more known identities; and

(e) associating the new faceprint with a new or known identity within a database comprising other data corresponding to the archived faceprints and associated parent images for performing further comparisons with further faceprints, to permit data corresponding to the new faceprint and its associated parent image to be archived according to the associating by the workflow module within one or more digital data storage media, and

wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing comprises determining proximities of the values of the face classifier parameters of the new face print image with values corresponding to the one or more archived faceprints, and

wherein the determining comprises automatically determining that the new faceprint corresponds to a known identity when comparisons of the face classifier parameter values of the first face print with multiple archived faceprints corresponding to a same known identity each result in a determination of an identity match.

138. (original) The method of claim 129, wherein the determining comprises requesting user confirmation whether the new faceprint corresponds to a known identity when comparisons of the face classifier parameter values of the first faceprint with multiple archived faceprints corresponding to a same known identity result in at least one determination of an identity match and at least one determination that the identities do not match.

139. (currently amended) ~~The method of claim 128~~ A method for classifying and archiving images including face regions that are acquired with an image acquisition device, comprising:

(a) generating a normalized face region from an identified face region within digital image data acquired by the acquisition device;

(b) automatically extracting a set of face classifier parameter values, collectively referred to as a faceprint, from the normalized face region;

(c) automatically comparing said extracted faceprint to a database of archived faceprints previously determined to correspond to one or more known identities;

(d) determining based on the comparing whether a new faceprint corresponds to any of the one or more known identities; and

(e) associating the new faceprint with a new or known identity within a database comprising other data corresponding to the archived faceprints and associated parent images for performing further comparisons with further faceprints, to permit data corresponding to the new faceprint and its associated parent image to be archived

according to the associating by the workflow module within one or more digital data storage media, and

wherein one or more archived faceprints have been previously determined to correspond to the one or more known identities, and the comparing comprises determining proximities of the values of the face classifier parameters of the new face print image with values corresponding to the one or more archived faceprints, and

wherein the determining comprises requesting user confirmation whether the new face print image corresponds to one or more known identities when comparisons of the face classifier parameter values of the new faceprint with multiple archived faceprints corresponding to multiple known identities result in determinations of identity matches with at least two different identities.

140. (currently amended) The method of claim 137 ~~427~~, wherein the associating comprises grouping the new faceprint with a new or prior face class defined by values of one or more face classifier parameters.

141. (original) The method of claim 140, wherein when the determining results in no identity matches between the new faceprint and any known identity, the method further comprises:

- (i) determining that the new face print image corresponds to a new identity;
- (ii) grouping the new face print image with a new face class defined by sets of boundary face classifier parameter values.

142. (currently amended) The method of claim 137 ~~428~~, further comprising determining that a new image is presented for face detection processing.

143. (currently amended) The method of claim 137 ~~428~~, further comprising obtaining user input in the detection of face candidate regions.

144. (currently amended) The method of claim 136 ~~428~~, further comprising classifying, archiving or recalling of faceprints or associated normalized face regions, or combinations thereof.

145. (currently amended) The method of claim 137 ~~428~~, further comprising verifying that the face region is similar enough to a face region of one or more known identities to be correctly recognized.

146. (original) The method of claim 145, further comprising completing the recognition process by determining which of said known identities said face region should be associated with.

147. (currently amended) The method of claim 137 ~~428~~, wherein the generating further comprises performing one or more additional normalizing operations.

148. (original) The method of claim 147, wherein the performing comprises luminance, size, or orientation normalizing, or combinations thereof.

149. (currently amended) The method of claim 137 ~~428~~, wherein the generating further comprises size normalizing of said face region.

150. (currently amended) The method of claim 137 ~~428~~, further comprising archiving the new faceprint and its associated parent image, according to the associating, within one or more digital data storage media.

151. (original) The method of claim 150, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint corresponding to the new identity comprises associating the new data with archived data corresponding to one or more known identities based on a relationship between the new identity and the one or more known identities.



152. (original) The method of claim 150, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint corresponding to the new identity comprises associating the new data with a further new identity based on a relationship between the two new identities.

153. (original) The method of claim 150, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint comprises generating a new face class defined by sets of boundary face classifier parameter values including the particular face parameter values of the new face print image.

154. (original) The method of claim 153, wherein the archiving further comprises grouping the new face class with another face class within a same identity table corresponding to a same appearance of a known identity.

155. (original) The method of claim 154, wherein the archiving further comprises adjusting boundary face classifier parameter values of a different identity based on adjusted boundary values of the identity including the new face class.

156. (original) The method of claim 155, wherein the archiving further comprises grouping the new face class within a first identity table, and grouping the first identity table with a second identity table, including a second face class, together within a same appearance table corresponding to a different appearances of a same known identity.

157. (original) The method of claim 156, wherein the archiving further comprises adjusting boundary face classifier parameter values of a different identity based on new or adjusted boundary values of the identity including the new face class.

158. (original) The method of claim 153, wherein the archiving further comprises grouping the new face class within a previously generated identity table including multiple face classes corresponding to multiple different values of face classifier parameters corresponding to a same appearance of a same identity.

159. (original) The method of claim 150, wherein the archiving further comprises adjusting boundary face classifier parameter values of the identity based on parameters of the new face class.

160. (currently amended) The method of claim 159, wherein the archiving further comprises adjusting boundary face classifier parameter values of a different identity based on parameters of the adjusted boundary values of the identity including ~~a~~ the new face class.

161. (original) The method of claim 150, wherein the archiving of the new data corresponding to the face classifier parameters of the new faceprint comprises grouping the new faceprint within a previously-determined face class defined by sets of boundary face classifier parameter values including particular face classifier parameter values of the new faceprint.

162. (original) The method of claim 161, wherein the archiving further comprises re-defining the boundaries of the previously-determined face class based on one or more particular face classifier parameter values of the new faceprint being outside previously established boundary values.

163. (original) The method of claim 161, wherein the face class has been previously grouped with one or more other face classes within a same identity table corresponding to a same known identity, and wherein the archiving further comprises adjusting boundary values of the identity table based on adjusted boundary values of the face class including the new faceprint.

164. (original) The method of claim 150, wherein the archiving enabled further comparisons with further faceprints and recalling of the faceprints and their associated normalized face regions and parent images.

165. (currently amended) The system of claim 137 ~~428~~, further comprising determining that the face region has a particular pose aspect.

166. (original) The method of claim 165, further comprising completing the recognition process by comparing and determining a match of face classifier parameters with a previously determined known identity sharing a similar pose aspect.

167. (currently amended) The method of claim 137 ~~428~~, further comprising digitally organizing and selectively-recalling said new and archived faceprints and the associated parent images.